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(71) Applicant: INCA Internet Co., Ltd. [KR/KR]; 509 Ace Techno Tower V, 197-22, Kuro-3dong, Kuro-ku, Seoul 152-848 (KR).

(72) Inventor: LEE, Dong-Hyuk; Room 302, 299-41, Sangdo-dong, dongjak-ku, Seoul 156-846 (KR).

(74) Agent: YOO, Jong-Jeong; Room 401, Gangnam Jeil Building 822-4, Yeoksam-dong, Gangnam-ku, Seoul 135-080 (KR).

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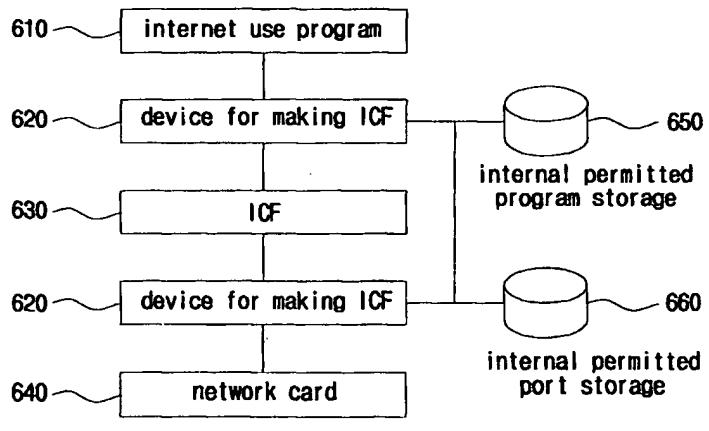
(54) Title: FLEXIBLE NETWORK SECURITY SYSTEM AND METHOD FOR PERMITTING TRUSTED PROCESS



(57) Abstract: Disclosed herein is a flexible network security system and method for permitting a trusted process. The system includes a port monitoring unit for extracting information about a server port being used through a network communication program, an internal permitted program storage for extracting information about a program for which communication is permitted by the firewall, and registering the extracted information, an internal permitted port storage, if the port monitoring unit extracts the information about the server port being used using the program registered in the internal permitted program storage, registering the extracted information about the server port; and a device for making the firewall flexible, determining whether a destination port of a packet of inbound traffic has been registered in the internal permitted port storage, and if the destination port has not been registered, transmitting the corresponding packet to the firewall, and if the destination port has been registered, allowing the corresponding packet to bypass the firewall.

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Description

FLEXIBLE NETWORK SECURITY SYSTEM AND METHOD FOR PERMITTING TRUSTED PROCESS

Technical Field

[1] The present invention relates generally to a flexible network security system and method for permitting a trusted process and, more particularly, to a network security system and method, in which a port, which is used by a program for which communicationis permitted, is automatically added to or removed from an internet connection firewall, thus allowing inexpert users to easily use the internet connection firewall having excellent functionality.

Background Art

[2] A firewall is a security system that forms a protection border between a network and the outside thereof.

[3] FIG. 1 is a view showing an Internet Connection Firewall (ICF) for protecting a computer and a network, which has been basically provided by Microsoft Inc. since the XP version of Windows.

[4] The ICF is software used to set restrictions on information communicated between a network or small-scale network and the Internet, and protects an Internet connection of a single computer to the Internet.

[5] Meanwhile, a conventional ICF is a stateful firewall. The term stateful firewall refers to a firewall which monitors all the communication passing through a corresponding path, and inspects the original of each message to be processed, a target address and a port.

[6] The ICF permits outbound traffic but blocks inbound traffic, so that a network inside the ICF is not seen from the outside. For this reason, in a Personal Computer (PC) firewall, this function is referred to as a "stealth function."

[7] The operation of the ICF is described in brief below.

[8] The ICF keeps track of traffic originating from an ICF computer, and maintains a communication table, so that unwanted traffic does not enter through the personal connection. Further, all inbound traffic on the Internet is compared with the items in the table. Only in the case where it is proved that a matching item exists in the table and communication originated from the user's computer, inbound Internet traffic is connected to a network computer.

[9] In contrast, in the case where an Internetconnection is not permitted on the basis of

a firewall permission list, the ICF disconnects the connection. Accordingly, general hacking, such as port scanning, can be blocked by automatically canceling unwanted communication.

[10] For example, when an ICF computer is scanned using a Linux nmap scanning tool in order to check such a case, the ICF computer does not respond to any scan operation, so that Network Mapper (Nmap) determines that a target computer does not exist on a network for every scan, and outputs the message "Host Seems Down." As described above, the ICF blocks general hacking, such as port scanning, is performed by automatically canceling unwanted communication.

[11] Meanwhile, when the ICF is installed in a web service providing computer, the ICF blocks inbound traffic, so that the Internetconnection is disconnected, and, therefore, normal web service cannot be offered. To solve this problem, the ICF permits inbound traffic to Port 80 used by service, thus being capable of allowing normal web service.

[12] As described above, the ICF allows normal service to be used by adding services and protocols, and the PC firewall also provides such functions.

[13] Meanwhile, the problem of the ICF is described below.

[14] Recent Internet software, such as a web server, a File Transfer Protocol (FTP) server, a telnet server, a peer-to-peer (P2P) program, a remote control program and a messenger program, operates as service providing servers. Furthermore, the amount of software operating as a server as described above is increasing remarkably, and such software trends toward being used by many general users.

[15] However, most users avoid using stealth function of the ICF or PC firewall because the above-described software operating as a server does not operate normally. In Windows XP shown in FIG. 2, the corresponding software can be normally used by adding a port, a protocol, and an Internet Protocol (IP) used by the software operating as a server uses. However, it is difficult for inexpert users to set them because the inexpert users have difficulty in finding a port operating as a server.

[16] Furthermore, since a port operating as a server may be changed when the version of the software is upgraded, normal service may be unexpectedly interrupted. For these reasons, there is a problem in that it is difficult for general users to use the stealth functions of the ICF and the PC firewall despite their desired characteristics.

Disclosure of Invention

Technical Problem

[17] Accordingly, the present invention has been made keeping in mind the above

problems occurring in the prior art, and an object of the present invention is to provide a network security system and method, in which a port, which is used by a program for which communication is permitted, is automatically added to or removed from an internet connection firewall, thus allowing inexpert users to easily use a desired function of the internet connection firewall.

Technical Solution

[18] In order to accomplish the above object, the present invention provides a network security system for permitting a trusted process using a firewall, the firewall protecting a corresponding network connection of a computer to a network by setting restrictions on information communicated between networks, including a port monitoring unit for extracting information about a server port being used through a network communication program; an internal permitted program storage for extracting information about a program for which communication is permitted by the firewall, and registering the extracted information; an internal permitted port storage, if the port monitoring unit extracts the information about the server port being used using the program registered in the internal permitted program storage, registering the extracted information about the server port; and a device for making the firewall flexible, determining whether a destination port of a packet of inbound traffic has been registered in the internal permitted port storage, and if the destination port has not been registered, transmitting the corresponding packet to the firewall, and if the destination port has been registered, allowing the corresponding packet to bypass the firewall.

[19] In addition, in order to accomplish the above object, the present invention provides a network security method of permitting a trusted process using a firewall, the firewall protecting a corresponding network connection of a computer to a network by setting restrictions on information communicated between networks, including the first step of extracting information about a server port being used through a network communication program; the second step of extracting information about a program for which communication is permitted by the firewall, and registering the extracted information in an internal permitted program storage; the third step of, if information about the server port being used is extracted using the program registered in the internal permitted program storage at the first step, registering the information about the extracted server port in an internal permitted port storage; the fourth step of determining whether a destination port of a packet of inbound traffic has been registered in the internal permitted port storage; the fifth step of, if, as a result of the determination at the fourth step, the destination port has not been registered, transmitting

the packet of inbound traffic to the firewall and the sixth step of, if, as a result ofthe determination at the fourth step, the destination port has been registered, allowing the corresponding packet to bypass the firewall.

[20] Preferably, in the case of performing communication using Transmission Control Protocol (TCP), the first step is extracts a listen port through hooking when a socket performs Listen to operate as a server.

[21] Preferably, in the case of communication using User Datagram Protocol (UDP), the first step extracts the server port by performing hooking in a user mode when a socketcalls a relevant function to receive a packet.

Advantageous Effects

[22] As described above, in accordance with the present invention, a port which is used by a program for which communication is permitted is automatically added to or removed from the ICF, so that inexpert users are capable of easily using the ICF having excellent functionality.

Brief Description of the Drawings

[23] The above and other objects, features and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[24] FIG. 1 is a view showing an ICF for protecting a computer and a network, which has basically been provided by Microsoft Inc. since the XP version of Windows;

[25] FIG. 2 is a view showing an interface screen that allows a port, a protocol, and an IP, which are used by software that operates as a server uses in Windows XP, to be added

[26] FIG. 3 is a block diagram showing the mode division of a Microsoft Windows operating system used in the present invention

[27] FIG. 4 is a schematic flowchartshowing the operation of an ICF according to the present invention, which illustrates processes of installing a port monitoring unit and the ICF, and storing a permitted program list in an internal permitted program storage

[28] FIG. 5 is a view showing an interface screen that is displayed to allow a communication permitted program list to be stored in an internal permitted program storage in a flexible ICF in accordance with an embodiment of the present invention;

[29] FIG. 6 is a block diagram showing the operation of an entire firewall using a device for making an ICF flexible according to the present invention

[30] FIG. 7 is a flowchart showing a process of storing and deleting a server port in and

from the internal permitted port storage of a flexible ICF according to an embodiment of the present invention and

[31] FIG. 8 is a flowchart showing a packet processing flow performed in front of an ICF in accordance with an embodiment of the present invention.

Best Mode for Carrying Out the Invention

[32] A flexible network security system and method for permitting a trusted process and method in accordance with an embodiment of the present invention is described in detail with reference to the accompanying drawings below.

[33] First, the related art corresponding to the background of the present invention is described in brief.

[34] FIG. 3 is a block diagram showing the mode division of a Microsoft Windows operating system used in the present invention.

[35] Referring to FIG. 3, Windows XP, which is provided by Microsoft Inc., provides a kernel mode and a user mode. In the kernel mode, an operating system kernel and various kinds of device drivers are driven, and in the user mode, applications are mainly driven. Programs which operate in the kernel mode existin the form of device drivers. A kernel mode network structure supported by the Microsoft Windows operating system includes afd.sys (AFD), that is, the kernel of a Windows socket, a Network Driver Interface Specification(NDIS), and a Transport Driver Interface (TDI).

[36] The afd.sys which exists at the uppermost layer in the kernel mode communicates with msafd.dll, that is, a Dynamic link library (DLL) which exists at the lowermost layer in the user mode Windows socket, and constitutes an interface with TDI existing at the lower layer thereof.

[37] The TDI defines a kernel mode interface which exists above a protocol stack. The NDIS provides a standard interfacefor Network Interface Card Device Drivers (NICDDs).

[38] A method of constructing a firewall in the user mode of the Microsoft Windows operating system is described below in brief.

[39] Hooking refers to a widely known programmingmethod that stores the address of a original function intended to be hooked, and replaces the address of the original function with the address of a function made by the user, thus allowing the original function to be executed afterward through the execution of the function made by the user.

[40] 1) Winsock Layered Service Provider (LSP)

[41] This method is a method provided by Microsoft Inc., which is based on a Service

Provider Interface (SPI) that is a component existingin Microsoft networking widely used in Quality Of Service (QOS), URL filtering, and the encryption of a data stream.

[42] 2) Windows 2000 Packet Filtering Interface

[43] Windows 2000 uses a method of installing a filter descriptor so that an application program in the user mode can perform permission and blocking on the basis of an IP address and port information.

[44] 3) Winsock Dll replacement

[45] This method is based on a method of filtering by replacing the Winsock DLL of Microsoft Windows with a DLL made by the user.

[46] 4) Global Function Hooking

[47] This method is based on a method of hooking the socket functions in Windows, such as Connect, Listen, Send, Recv, Sendto, and Recvfrom, or a DeviceIoControl() function that application in the user mode uses to communicate with a driver in the kernel mode.

[48] A method of constructing a firewall in the kernel mode of the Microsoft Windows operating system is described in brief below.

[49] 1) Kernel Mode Socket Filter

[50] This scheme is based on a method of hooking all the Inputs/Outputs (I/Os) in which msafd.dll, which is a DLL existing at the lowermost layer below a Windows socket in the user mode, communicates with afd.sys, which is a kernel mode Windows socket.

[51] 2) TDI filter driver

[52] This scheme is based on a method of utilizing a filter driver produced by applying an IoAttackDevice() API to a device created by a tcpip.sys driver, such as \Device\RawIp, \Device\Udp, \Device\Tcp, \Device\Ip, \Device\MULTICAST. Alternatively, this method is based on a method of hooking all I/Os by replacing a dispatch table existing in the driver object of tcpip.sys.

[53] 3) NDIS InterMediate (IM) driver

[54] This scheme is a method, which is provided to users by Microsoft Inc., and allows a firewall and aNetwork Address Translation (NAT) to be developed through insertion between a protocol driver, such as TCP/IP, and an NIC driver.

[55] 4) NDIS hooking filter driver

[56] This scheme is a method of hooking the functions of a NDIS library, which is based on a method of hooking functions, such as NdisRegisterProtocol, NdisDeregisterProtocol, NdisOpenAdapter, NdisCloseAdapter and NdisRegisterProtocol, or a method of hooking the I/Os of a Protocol driver and an NIC driver in communication

with the NDIS after finding an existing registered protocol driver link on the basis of a returned NdisProtocolHandle, such as TCP/IP, using an NdisRegisterProtocol function that registers the Protocol driver thereof.

[57] The ICF according to the present invention may be implemented in the above-described kernel mode socket filter, TDI filter driver, NDIS IM driver and NDIS hooking filter, and is generally implemented in the NDIS IM driver or NDIS hooking filter driver.

[58] The ICF maintains the entire communication table of IPs and ports by keeping track of traffic originating from an ICF computer. All inbound traffic from the Internet is compared with items existing in this communication table. Only when it is proved that a matching item exists in the table and, therefore, communication originated from the user's computer, inbound Internet traffic is permitted; otherwise the traffic is blocked.

[59] Granting permission to the inbound traffic is performed by calling the address of a hooked original function. In contrast, blocking to the inbound traffic is performed by sending a false return indicating that the call to the original function succeeded or failed without calling the original function, or providing false information so that the original function is called but the performance of the function is not performed normally.

[60] A flexible network security system and method for permitting a trusted process according to the present invention is described based on the above-described basic description related to the firewall.

[61] FIG. 4 is a schematic flowchart showing the operation of an ICF according to the present invention, which illustrates processes of installing a port monitoring unit and the ICF, and storing a permitted program list in an internal permitted program storage.

[62] First, at step S410, a port monitoring unit and an ICF are installed.

[63] In the case of TCP, when a socket performs Listen to operate as a server, the port monitoring unit extracts a listen port through Winsock hooking. Furthermore, when a corresponding operation is performed in msafd.dll, a corresponding operation in a kernel is performed in the AFP, that is, the socket part of the kernel, or TDI_EVENT_CONNECT is called through TdiSetEvent() in the TDI, the port monitoring unit extracts the listen port.

[64] In the case of User Datagram Protocol (UDP), when a socket calls recvfrom to receive a packet, a server port for receiving the packet is extracted by Winsock hooking in the user mode. Furthermore, when a successive operation in the AFD exists in the kernel mode, or when TDI_EVENT_RECEIVE_DATAGRAM is created

through corresponding TdiSetEvent(), a server port for receiving a packet is extracted.

[65] The port monitoring unit is installed byWinsock hooking in the user mode, or by the kernel mode socket filter and the TDI filter driver in the kernel mode, and functions to extract server port information, protocol information (TCP, UDP, etc.), and OPEN/CLOSE information.

[66] Thereafter, the ICF is installed. Such an ICF may be implemented in a kernel mode socket filter, a TDI filter driver, an NDISIM driver, a Windows 2000 filter hook driver and an NDIS hooking filter driver, and is generallyinstalled through the NDIS IM driver or the NDIS hooking filter driver in the same manner as described above.

[67] Then, at step S420, a permitted program list is stored in an internal permitted program storage. FIG. 5 is a view showing an interface screen that is displayed to allow a communication permitted program list to be stored in an internal permitted program storage in the flexible ICF in accordance with an embodiment of the present invention.

[68] As shown in FIG. 5, when a program to be permitted by the ICF is selected, a program name, the entire path of a program, and, the Message Digest algorithm 5 (MD5) hash value of a corresponding program file for checking, and the integrity of the program are obtained. The program name, the entire path of a program, and the program MD5 hash value obtained as described above are stored in the internal permitted program storage.

[69] The internal permitted program storage storesdata in the form of the following Table 1, and in the form of a file or a database including information about the program name, the entire path of a program, and the program MD5 hash value.

[70] Table 1

	Entire path of program	Program MD5 hash value
1	D:\Program Files\MSN Messenger\msnmsgr.exe	0x83276482764827686823764826 37872
2	D:\Program Files\PcAnywhere.exe	Ox938472938742983794279739284 79374
3		
...		

[71] FIG. 6 is a block diagram showing the operation of an entire firewall using a device

for making an ICF flexible device according to the present invention, which is described in detail below.

[72] When an Internet use program 610 opens a server port to operate as a server, a device for making an ICF flexible 620 determines whether a program, which opened the corresponding server port, has been registered in an internal permitted program storage 650.

[73] When the corresponding program has been registered, the device for making an ICF flexible 620 registers the opened server port in an internal permitted port storage 660.

[74] Meanwhile, when inbound traffic is transmitted from the outside, the inbound traffic reaches an ICF 630 after passing through a network card 640. The device for making an ICF flexible 620 determines whether a destination port has been registered in the internal permitted port storage 660 by examining the packets of the inbound traffic.

[75] If, as a result of the determination, the corresponding port has not been registered, a packet is transmitted to the ICF 630 and the packet is blocked. However, if the corresponding port has been registered, a packet is not permitted to pass through the ICF 630, and a hooked original function is called to bypass the packet to the device for making an ICF flexible 620 registers.

[76] The following Table 2 is an example showing ports registered in the internal permitted port storage.

[77] Table 2

	Entire path of program	Protocol	Port
1	D:\Program Files\MSN Messenger\msnmsgr.exe	TCP	1863
2	D:\Program Files\MSN Messenger\msnmsgr.exe	TCP	6891
3	D:\Program Files\PcAnywhere\PcAnywhere.exe	TCP	5631
4	D:\Program Files\PcAnywhere\PcAnywhere.exe	UDP	5632
...			

[78] As shown in Table 2, the internal permitted port storage includes information about the entire path of a program, the protocol and the port, and may exist in the forms of an

array orconnection list in memory, or in the form of a file or a database.

[79] FIG. 7 is a flowchart showing a process of storing and deleting a server port in and from the internal permitted port storage of a flexible ICF according to an embodiment of the present invention, which is described in detail below.

[80] First, at step S701, information about a server port, OPEN/CLOSE information, and information about protocol are extracted from the port monitoring unit, and then, at step S703, the port monitoring unit determines whether a current program, which opened the server port, has been registered in the internal permitted program storage.

[81] Meanwhile, a method of obtaining information about a current process that is using a network is performed in such a way that the portmonitoring unit extracts the ID information of the current process using a PsGetCurrentProcessId() function, and acquires the entire path of the current program through the process ID. The MD5 hash value of the corresponding program is extracted through the entire path of the program obtained as describedabove, and it is determined whether the current program exists in the internal permitted program storage using the MD5 hash value and the entire path of the program.

[82] If, as a result of the determination at step S703, the current program has not been registered, the process ends. In contrast, if the current program has been registered, at step 705, it is determined whether the server port is opened or closed using the extracted OPEN/CLOSE information.

[83] If, as a result of the determination at step S705, the server port has been opened, the information about the entire path of the program, the protocol and the server port is registered at step S709, and the process ends.

[84] In contrast, if, as a result of the determination at step S705, the server port has not been opened, the items of the permitted port storage matched with the information about the entire path of the program, the protocol and the server port are searched for and then deleted at steps S706 and S707, and the process ends.

[85] FIG. 8 is a flowchart showing a packet processing flow performed in front of an ICF in accordance with an embodiment of the present invention, which is described in detail below.

[86] First, at step S801, a packet is extracted from inbound traffic beforebeing processed by the ICF and, then, at step S803, information about a corresponding destination (local) port and a protocol is extracted from the extracted packet.

[87] Thereafter, at step S805, it is determined whether information abouta corresponding destination (local) port and a protocol has been registered in the internal permitted port

storage.

[88] If, as a result of the determination at step S805, the information has not been registered, the corresponding packet is transmitted to the ICF at step S807. In contrast, if the information has been registered, the destination port must be a permitted port, so that the inbound traffic is allowed to bypass the ICF by calling a hooked original function.

Mode for the Invention

[89] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, it will be apparent to those skilled in the art that various modifications, additions and substitutions thereof are possible, without departing from the spirit of the invention. Accordingly, the scope of the invention will be limited only by the accompanying claims, in which it will be appreciated that the examples of the modifications, additions and substitutionsare all included.

Industrial Applicability

[90] As described above, in accordance with the present invention, a port which is used by a program for which communicationis permitted is automatically added to or removed from the ICF, so that inexpert users are capable of easily using the ICF having excellent functionality.

Claims

[1] A network security system for permitting a trusted process using a firewall, the firewall protecting a corresponding network connection of a computer to a network by setting restrictions on information communicated between networks, comprising:

a port monitoring unit for extracting information about a server port being used through a network communication program;

an internal permitted program storage for extracting information about a program for which communication is permitted by the firewall, and registering the extracted information;

an internal permitted port storage, if the port monitoring unit extracts the information about the server port being used using the program registered in the internal permitted program storage, registering the extracted information about the server port; and

a device for making the firewall flexible, determining whether a destination port of a packet of inbound traffic has been registered in the internal permitted port storage, and if the destination port has not been registered, transmitting the corresponding packet to the firewall, and if the destination port has been registered, allowing the corresponding packet to bypass the firewall.

[2] The network security system as set forth in claim 1, wherein the information about the program, which is extracted and registered in the internal permitted program storage, includes information about a program name, an entire path of the program, and a program Message Digest 5 (MD5) hash value.

[3] The network security system as set forth in claim 1, whereinthe information about the server port, which is extracted and registered in the internal permitted port storage, includes information about an entire path of the program, a protocol, and a port.

[4] A network security method of permitting a trusted process using a firewall, the firewall protecting a corresponding network connection of a computer to a network by setting restrictions on information communicated between networks, comprising:

the first step of extracting information about a server port being used through a network communication program;

the second step of extracting information about a program for which com-

munication is permitted by the firewall, and registering the extracted information in an internal permitted program storage;

the third step of, if information about the server port being used is extracted using the program registered in the internal permitted program storage at the first step, registering the information about the extracted server port in internal permitted port storage;

the fourth step of determining whether a destination port of a packet of inbound traffic has been registered in the internal permitted port storage;

the fifth step of, if, as a result of the determination at the fourth step, the destination port has not been registered, transmitting the packet of inbound traffic to the firewall and

the sixth step of, if, as a result of the determination at the fourth step, the destination port has been registered, allowing the corresponding packet to bypass the firewall.

[5] The network security method as set forth in claim 4, wherein, in the case of performing communication using Transmission Control Protocol (TCP), the first step extracts a listen port through hooking when a socket performs listen to operate as a server.

[6] The network security method as set forth in claim 4, wherein, in the case of communication using User Datagram Protocol (UDP), the first step extracts the server port by performing hooking in a user mode when a socket calls a relevant function to receive a packet.

[7] The network security method as set forth in claim 4, wherein, the sixth step allows the corresponding packet to bypass the firewall by calling a hooked original function.

[8] The network security method as set forth in claim 4, wherein the information about the program, which is extracted and registered at the second step, includes information about a program name, an entire path of the program, and a program Message Digest 5 (MD5) hash value.

[9] The network security method as set forth in claim 4, wherein the information of the server port, which is extracted and registered at the third step, includes information about an entire path of the program, a protocol, and a port.

[10] A computer-readable recording medium for performing a network security method using a firewall, the medium storing a program for executing the method, the method comprising:

the first step of extracting information about a server port being used through a network communication program;

the second step of extracting information about a program for which communication is permitted by the firewall, and registering the extracted information in an internal permitted program storage;

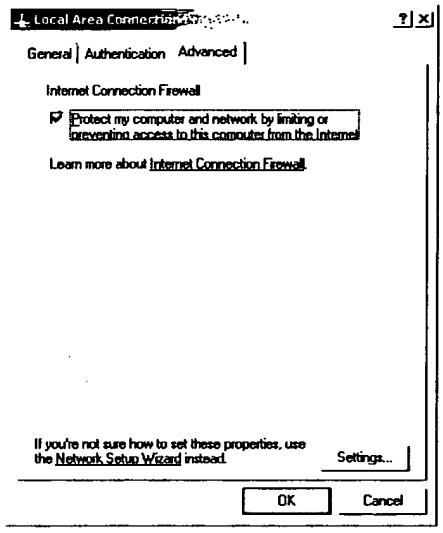
the third step of, if information about the server port being used is extracted using the program registered in the internal permitted program storage at the first step, registering the information about the extracted server port in an internal permitted port storage;

the fourth step of determining whether a destination port of a packet of inbound traffic has been registered in the internal permitted port storage;

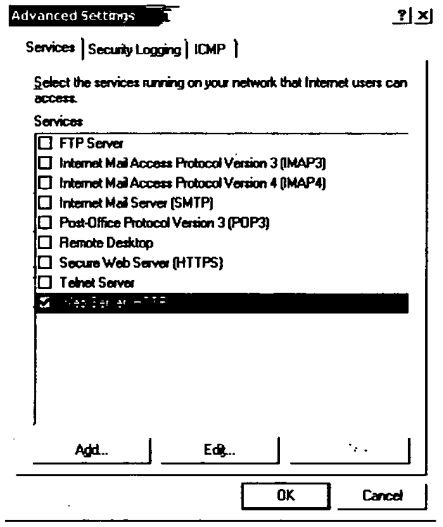
the fifth step of, if, as a result of the determination at the fourth step, the destination port has not been registered, transmitting the packet of inbound traffic to the firewall and

the sixth step of, if, as a result of the determination at the fourth step, the destination port has been registered, allowing the corresponding packet to bypass the firewall.

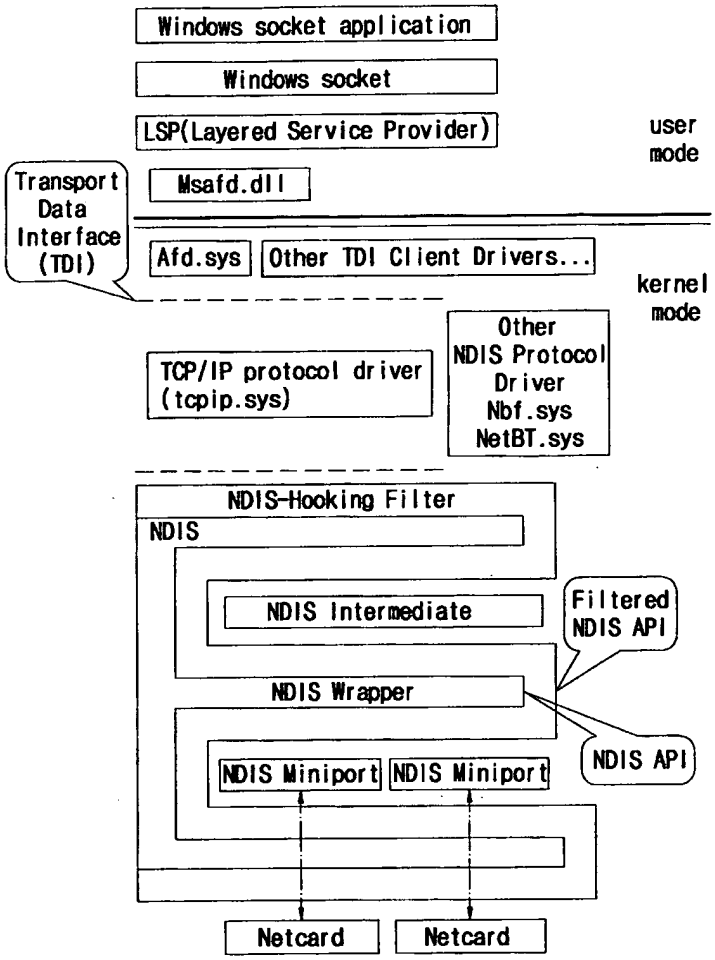
[Fig. 1]


Local Area Connection
General
Authentication
Advanced
Internet Connection Firewall
Protect my computer and network by limiting or preventing access to this computer from the Internet
Learn more about Internet Connection Firewall.
If you're not sure how to set these properties, use the Network Setup Wizard instead.
Settings...
OK
Cancel

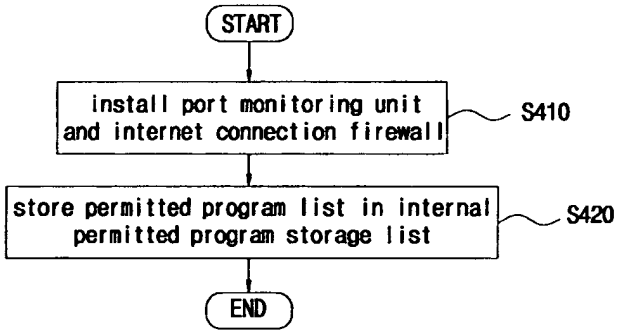
[Fig. 2]


Advanced Settings
Services
Security Logging
ICMP
Select the services running on your network that Internet users can access.
Services
FTP Server
Internet Mail Access Protocol Version 3 (IMAP3)
Internet Mail Access Protocol Version 4 (IMAP4)
Internet Mail Server (SMTP)
Post-Office Protocol Version 3 (POP3)
Remote Desktop
Secure Web Server (HTTPS)
Telnet Server
Add...
Edit...
OK
Cancel

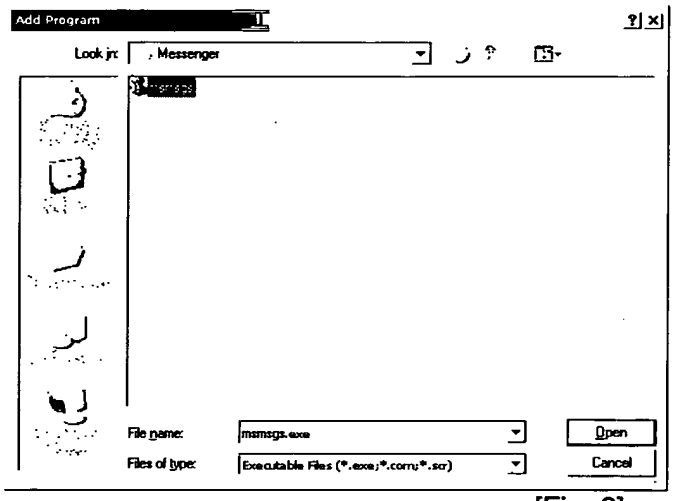
[Fig. 3]


Windows socket application
Windows socket
LSP(Layered Service Provider)
user mode
Transport Data Interface (TDI)
Msafd.dll
Afd.sys
Other TDI Client Drivers...
kernel mode
TCP/IP protocol driver (tcpip.sys)
Other NDIS Protocol Driver Nbf.sys NetBT.sys
NDIS-Hooking Filter
NDIS
NDIS Intermediate
Filtered NDIS API
NDIS Wrapper
NDIS API
NDIS Miniport
NDIS Miniport
Netcard
Netcard

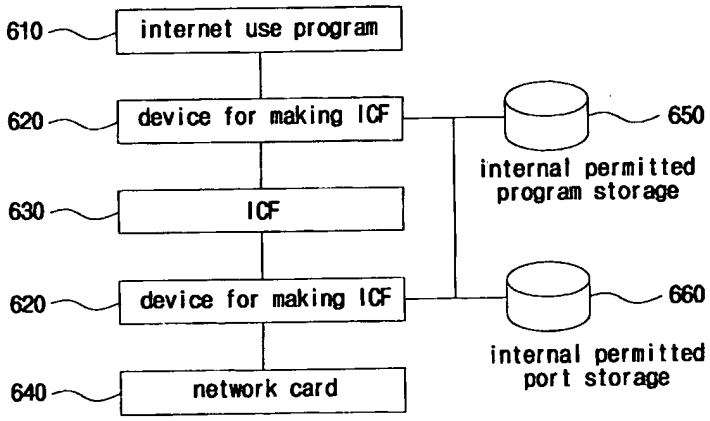
[Fig. 4]


START
install port monitoring unit and internet connection firewall
S410
store permitted program list in internal permitted program storage list
S420
END

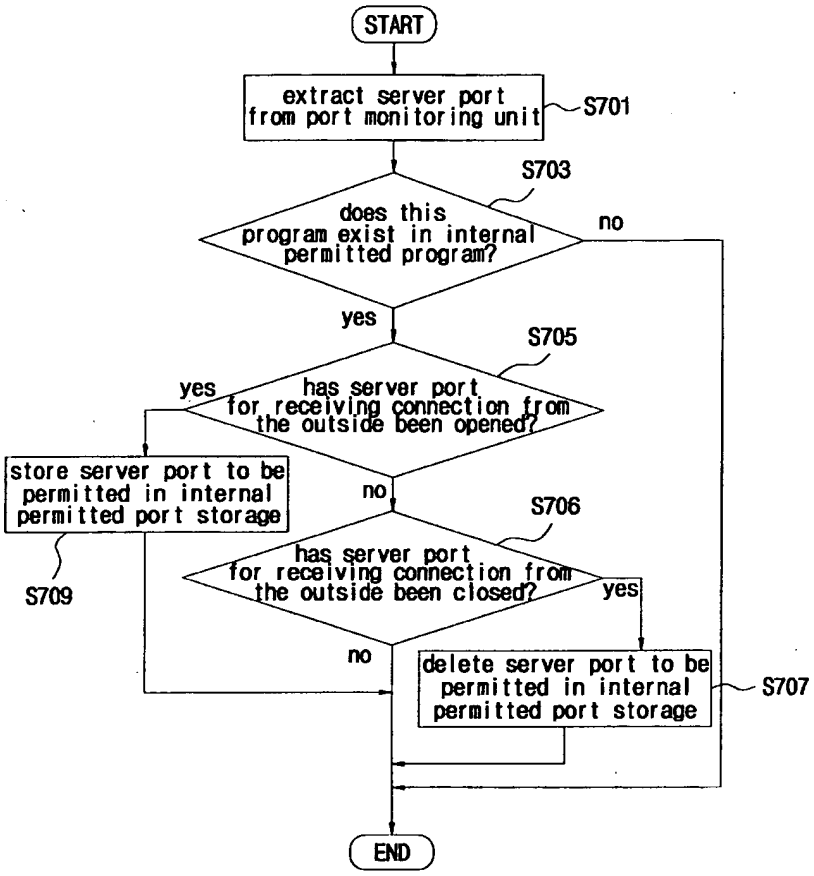
[Fig. 5]


Add Program
Look in:
Messenger
File name:
msmsgs.exe
Open
Files of type:
Executable Files (*.exe;*.com;*.scr)
Cancel

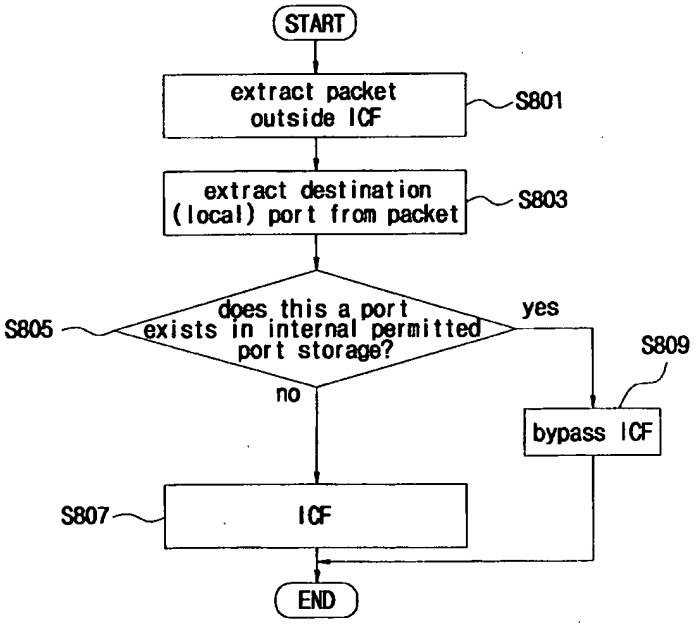
[Fig. 6]


610
internet use program
620
device for making ICF
650
internal permitted program storage
630
ICF
620
device for making ICF
660
internal permitted port storage
640
network card

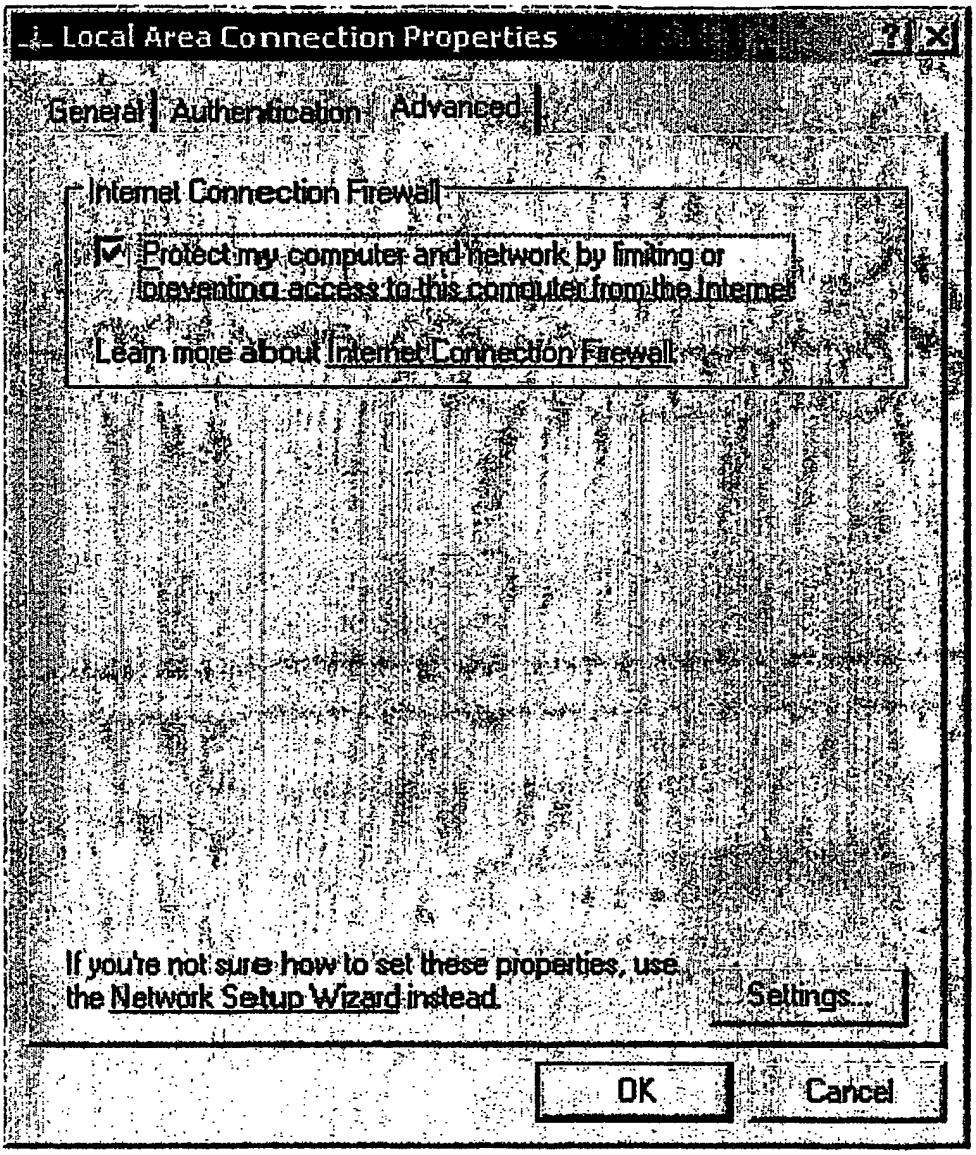
[Fig. 7]


START
extract server port from port monitoring unit
S701
S703
does this program exist in internal permitted program?
no
yes
S705
has server port for receiving connection from the outside been opened?
yes
store server port to be permitted in internal permitted port storage
S709
no
S706
has server port for receiving connection from the outside been closed?
yes
no
delete server port to be permitted in internal permitted port storage
S707
END

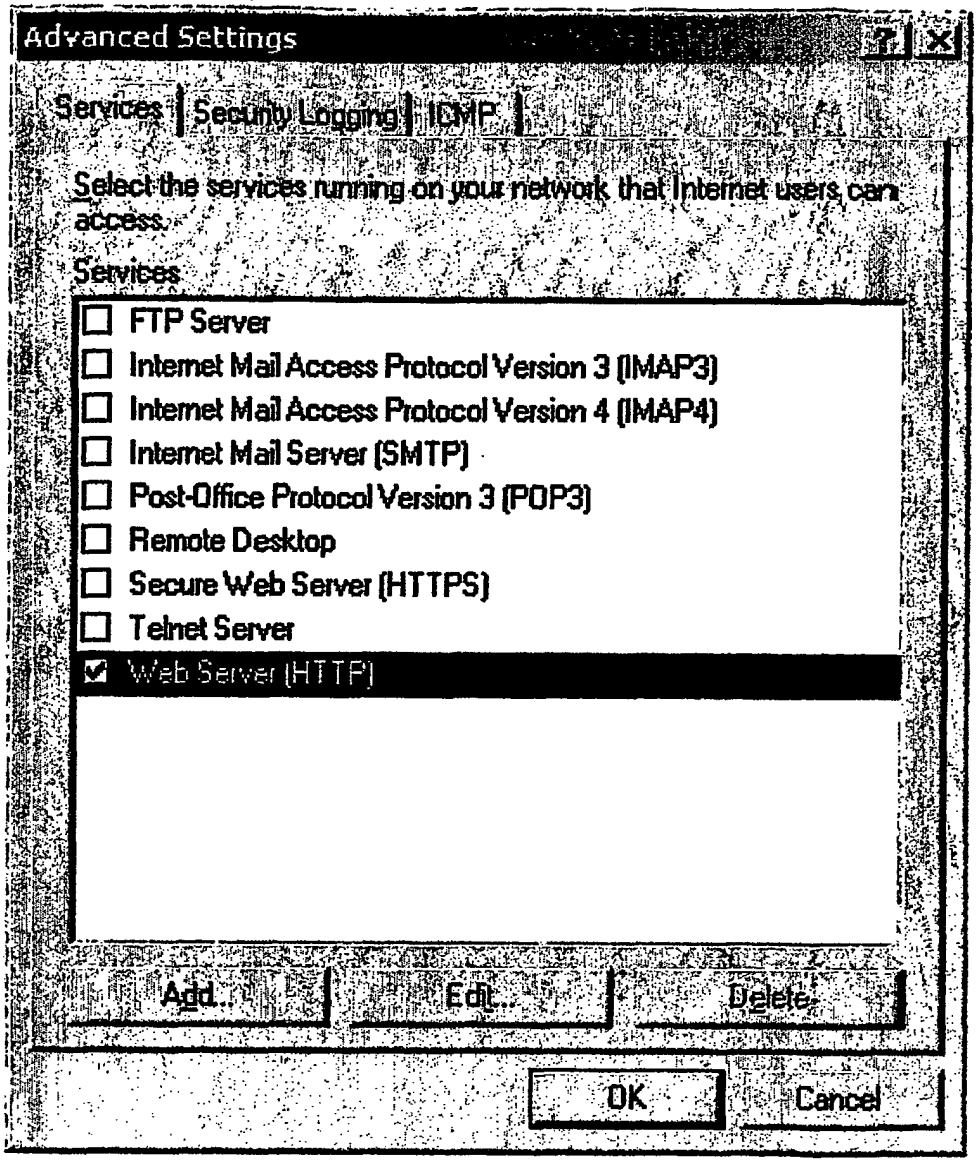
[Fig. 8]


START
extract packet outside ICF
S801
extract destination (local) port from packet
S803
S805
does this a port exists in internal permitted port storage?
yes
no
S809
bypass ICF
S807
ICF
END

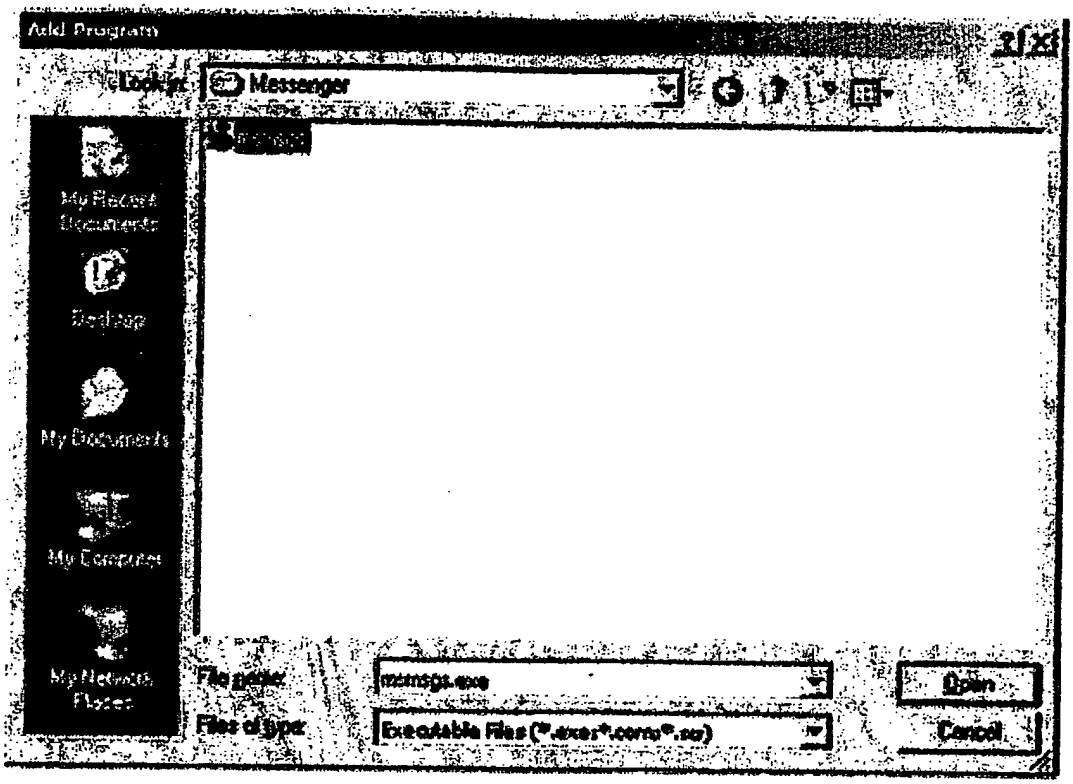
1/4/1
[Fig.1]



1/4/2
[Fig.2]



3/4
[Fig.5]



SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2004/003456

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 H04L 9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC7 H04L 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
KOREAN PATENTS AND APPLICATIONS FOR INVENTIONS SINCE 1975
KOREAN UTILITY MODELS AND APPLICATIONS FOR UTILITY MODELS SINCE 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Korean Intellectual Property Office Patent Search System "FIREWALL & NETWORK & SECURITY "

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y1	KR20020086434 A(SAMSUNG ELECTRONICS CO., LTD.) 18.Nov.,2002(2002.11.18) * THE WHOLE DOCUMENT	1-10
Y2	KR20020001190 A(LG ELECTRONICS INC.) 15.Jun.,2003(2002.06.15) * THE WHOLE DOCUMENT	1-10
A,P	JP2004054488 A(YOKOGAWA ELECTRIC CORP) 19.Feb.,2004(2004.02.19) * THE WHOLE DOCUMENT	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 APRIL 2005 (06.04.2005)	**11 APRIL 2005 (11.04.2005)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer UHM, In Kwon Telephone No. 82-42-481-5712

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR2004/003456

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR20020086434A	18.11.2002	NONE	
JP16054488 A	19.02.2004	NONE	
KR20020001190A	09.01.2002	US20010056550A1	27.12.2001